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## ZOOLOGY.

**The Limpet's Strength.**—The experiments made by J. Lawrence-Hamilton show that the shell-less limpet pulls 1984 times in the air its own weight, and about double when immersed in water.

Fasting fleas on an average pull 1493 times their own dead weight.

Other experimenters give the pulling power of the shell-deprived *Venus verrucosa* of the Mediterranean, a cockle-like creature, at 2071 times the weight of its own body.

The force required to open an oyster appears to be 1319.5 times the weight of the shell-less oyster. (Nature, March 24, 1892).

Dr. Steindachner has published the 15th part of his Ichthyologische Beiträge<sup>1</sup> in which he describes the following species of South American fresh-water fishes.

*Piabuca argentina* Lin. ; Iquitos.

*Piabuca spilurus* Günther ; Hyavary.

*Bergia* n. g. near *Chalcinus* ; no canines behind median teeth in lower jaw ; lateral line median.

*Bergia altipinnis* sp. nov. ; Arroyo Mignelete near Motevideo.

*Tetragonopterus lineatus* sp. nov. Iquitos.

*Tetragonopterus anomalus* sp. nov. Rio Parana near Corrientes.

*Xiphorhamphus jenynsii* Günther ; Arroyo Miquelete and Parahyba.

*Xiphorhamphus hepsetus* Cuv. ; Arroyo Miquelete and Parahyba.

**Medical and Other Opinions upon the Poisonous Nature of the Bite of the Heloderma.**—In North America there are two species of Heloderms,—the *Heloderma horridum* of Wiegmann, a form that does not occur within the limits of the United States, and the *Heloderma suspectum* of Cope, which is found principally in suitable localities throughout Arizona. There this, the biggest by all odds of all our lizards, is popularly known as the “Gila monster,” from the fact that it was once common on the Gila River. Collectors are now rendering it scarce over nearly all its range, and no doubt the time is not far distant, comparatively, when this highly interesting species will meet with utter extinction.

Living specimens of this reptile have been in the writer's possession for a year or two together, affording him admirable opportunities to

<sup>1</sup>Sb. Ak. Wiss. Wien, 1891.

study it in all particulars,—advantages I have fully availed myself of, as my published papers on the subject will attest.

Adult Heloderms average some twenty inches in length, and are covered with tuberculated scales, which vary in form in different parts of the body, and in old specimens are prone to ossify over the back and top of the head. These scales are of a shiny black and orange, the two colors being arranged in a definite pattern, which latter never agrees in any two specimens. Notwithstanding this great size for a lizard, and this most striking coloration, there are many people in Arizona and in the southwest generally that apply the name “Gila monster” to any large lizard-looking form that may come under their observation. I have had medical officers in the army, ranchmen, guides, and others, who surely ought to know better, point me out *Amblystomæ*, and even the common forms of the *Phrynosoma*, as Gila monsters. This being the case, I feel quite sure that the excellent figures which I have offered of a large female Heloderm that I had, some time ago, alive for nearly two years, will be acceptable, and in some respects exceedingly useful,—useful because the general opinion in the southwest and elsewhere is that the bite of this saurian is poisonous, and as a matter of diagnosis it is very desirable to know that the patient has actually been bitten by a Heloderm and not by something else.

Fig. 2 is from an instantaneous picture where I strapped my camera in such a position as to bring the focal axis of the lens perpendicular to the floor, where I placed a sheet of white blotting paper, over which the reptile walked beneath the instrument, allowing me to secure the photograph. In Figs. 1 and 3 the Heloderm was hypnotized, and thus easily taken. In Fig. 1 the ventral aspect of her head and body is resting upon a plane surface, which gives a flattened appearance, but otherwise the likeness is admirable. The leading herpetologist in this country, Professor Cope, who was my guest this week, examined these photographs and remarked that they gave a better idea of the form of a Heloderm than any of the many figures that had thus far been published, either here or in Europe.

We now come to consider that part of the subject that falls more properly within the title of this contribution,—in other words, the nature of the bite of these reptiles.

Even at the present writing the wide variance of opinion in these premises is truly remarkable, for some of our most distinguished investigators still disagree in the matter, and those, too, who have made the most exhaustive examinations of the saliva of this reptile.

As long ago as 1857, John Edward Gray, of the British Museum, in referring to *Necturus*, said: "I know of no other instance of a batrachian having this structure of its teeth, nor do I know of any instance, except in the Mexican lizard called *Heloderma horridum*, in which *all the teeth* are uniformly furnished with a basal cavity and foramen, and this lizard is said to be noxious; but the fact has not been distinctly proved."

Professor E. D. Cope, who first clearly characterized this reptile, and gave it its present name of *Heloderma suspectum*, has stated that "though the lizards of this genus could not be proved to inflict a poisonous bite, yet the salivary glands of the lower jaw were emptied by an efferent duct which issued at the base of each tooth, and in such a way that the saliva would be conveyed into the wound by the deep groove of the crown."

Then several years passed before much else was published upon this special topic of the life-history of the *Heloderma*, when Sumichrast, a well-known naturalist resident in Mexico, stated it as his opinion that it was the exception that small mammals died from the bite of this saurian.

Soon after there appeared an editorial in the *AMERICAN NATURALIST* (1882, page 842) referring to the experiments of Dr. Irwin, of the army, which went to prove that the bite of the *Heloderma* was comparatively harmless; but it added, further, that a specimen in the Zoological Garden of London had bitten a frog and a guinea-pig, both of which had died in a few moments. Still, the editor of the *NATURALIST* was of the opinion that "this might happen if this large lizard was not poisonous, and there is room for more careful experiments as to its venomous qualities."

In the same year no less distinguished an authority than Dr. Günther, of the British Museum, comes forward and states that there can be no doubt as to the poisonous nature of the bite of *Heloderma horridum*, and cites numerous cases to support his views; and Dr. Sclater, the secretary of the Zoological Society of London, apparently entertained a similar opinion, as did also the eminent herpetologist, Mr. Boulenger, of the British Museum.

During the same year the present writer, who was at that time connected with the Department of Reptiles at the United States National Museum, was severely bitten by an infuriated adult specimen of *Heloderma suspectum*, and although much pain and grave symptoms at once supervened, the results passed entirely away in a few days with barely any treatment. I published a short account of it at the time. Again,

before the year closed, Sir Joseph Fayrer brought forth some evidence, deduced from experiments, that went to show the poisonous nature of the bite of a Heloderm.

Early in 1883, however, the matter seemed to be definitely settled for good, and all through the results obtained by the very celebrated experiments of those two distinguished physicians of Philadelphia, Dr. S. Weir Mitchell and Dr. Edward T. Reichert. After a most carefully conducted series of experiments with the saliva taken from living Heloderms, these authorities were prepared to say that it possessed properties of an extremely venomous nature, killing pigeons and small mammals a few moments after they had received an injection of it hypodermically.

Five years now elapsed with hardly a printed word appearing anywhere upon the question of the poisonous or non-poisonous qualities of the saliva of one of these *suspected* reptiles. Then there appeared an account of the somewhat remarkable series of experiments made with the saliva of living Heloderms by Dr. H. C. Yarrow at the United States Natural Museum, Dr. Yarrow at the time being honorary curator of the Department of Reptiles in that institution. This investigator's methods of procedure were rather different from those adopted by Mitchell and Reichert, but apparently they were conducted with equal care, and, strange to say, led to an entirely different result. Some eight or nine experiments upon chickens and rabbits went to prove that hypodermic injections of the saliva and bites of angry Heloderms were by no means fatal to those animals, and practically they always recovered from the effects of the same. After presenting the steps of his final trial, this author concludes his account with the following remarks: "This experiment would seem to show that a large amount of the Heloderm saliva can be inserted into the tissues without producing any harm, and it is still a mystery to the writer how Dr. Mitchell and Dr. Reichert obtained entirely different results. Were it not for the well-known accuracy and carefulness of Dr. Mitchell, it might be supposed possibly that the hypodermic syringe used in his experiments contained a certain amount of *Crotalus obororca* venom, but under the circumstances, such a hypothesis is entirely untenable." The following year Dr. Mitchell still adhered to his original opinion, and undoubtedly does at the present time.

Mr. Samuel Garman, of the Museum of Comparative Zoology of Harvard University, next made some very interesting experiments, by allowing large and vigorous Heloderms to bite the shaved legs of

kittens, and here again these feline victims refused to succumb to the effects of the wounds.

Very evidently the last word upon this subject has not yet been said, and opinions are very much divided,—a host of supporters appearing upon either side. I have endeavored to give in this paper the bulk of the most reliable evidence now out and up to date; but there will undoubtedly be series of interesting experiments made with the saliva of this saurian in the future, and it is very important that there should be. To such experimenters I have a few suggestions to offer here,—the same which should be borne in mind at the time of their investigations, or even in the examination of a person bitten by a Heloderm.

In the case of the latter, ascertain if possible the exact condition of the patient at the time of the infliction of the wound, as regards both sobriety and his general condition. Make sure that the reptile that inflicted the bite was a specimen of a Heloderm. Be careful not to destroy the victim with the remedies you administer to offset the effects of the bite. A quart of raw whiskey, practically given at one dose, may prove more fatal than the bite of ten Heloderms. If the patient die after the bite of one of these reptiles, be sure to ascertain whether it was from the effects of the bite or from the effects of the remedies administered. The locality of the bite and other matters, of course, should also be carefully noted. (R. W. SHUFELDT in *New York Medical Journal*, May 3d, 1891.

**The Cervical Vertebrae of the Monotremata.**—In the January number of this journal, 1892, I have stated that the zygapophyses are absent in the cervicals of the Monotremata. I have been looking over a paper lately by C. Hasse and W. Schwarck, *Studien zum vergleichenden Anatomie der Wirbelsäule*, published in Vol. I, of Dr. C. Hasse's *Anatomische Studien*, Leipzig 1873; I find that these authors have also described the absence of the zygapophyses in *Ornithorhynchus* and *Tachyglossus* (*Echidna*).—G. BAUR.

**The Introduction of Reindeer into Alaska.**—A very interesting experiment in the introduction of reindeer into this country has been commenced. Dr. Sheldon Jackson, the government agent of education in Alaska, has begun the work. During the past season he imported sixteen reindeer from Siberia, which cost about \$160.00. Next year he proposes to establish a herd of reindeer in the neighborhood of Fort Clarence and expects to begin with 100 animals. Siberia has vast numbers of these animals, and in its climate and

vegetation resembles greatly Alaska, so that there is no reason to doubt that they will thrive on the eastern side of Bering Strait. The reindeer is useful as a draught animal for sleds, as well as for its milk, its meat, its skin. From the economical point of view the experiment is of the highest degree of interest, and it is gratifying to see that the Federal Government recognizes the importance of the work.

Capt. M. A. Healey, of the revenue cutter Bear, has reported to the Treasury Department, emphasizing the proposition as the most important question now before the Territory of Alaska. The recent destruction of seals and sea lions has certainly had its effect upon the food supply question of the country and islands in the neighborhood of Bering Strait, and any distress brought about by the destruction of seals may be alleviated by the introduction of the reindeer. In Iceland, where the reindeer was first introduced in 1870, it has increased greatly in number but is said to have relapsed into wildness and is now of little use to the inhabitants. It is to be hoped that better fortune will attend their introduction in Alaska, and that they will be treated as domestic animals, and not share the fate of the buffalo. (*Scientific American*, Oct. 31, 1891).

**Nomenclature of Mammalian Molar Cusps.**—In October 1888 I sent to the NATURALIST a table of nomenclature for the cusps of the molar teeth of Mammalia based upon the rise of these cusps from the single cone of the reptilian tooth as observed by Prof. Cope and myself. These terms have since been adopted by Cope, Scott, Lydekker, Flower, Schlosser and in part by Rüttimeyer. They have not, so far as I know, been adopted by any of the palæontologists of France. Fleischmann, of Erlangen, has opposed their adoption upon the ground that Cope and myself have mistaken the homologies of these cusps in the upper and lower teeth; I have been carefully over this paper and find that every point raised by Fleischmann is erroneous. This author and Döderlein have adopted Greek symbols for the cusps.

Subsequently I have proposed to extend the nomenclature to the crests of the upper and lower molars in the Ungulata.<sup>1</sup> In this paper, as Lydekker has very courteously pointed out, I unfortunately confused "crochet" and "anticrochet" of Busk, and did not rightly interpret Huxley's "pillars." The latest contribution to terminology is Prof. Scott's, which is based upon the law that where the premolars

<sup>1</sup>Bull. Mus. Comp. Zool., Vol. XX, No. 3, Nov. 1890, p. 88.

assume the molar form the corresponding cusps *are not homologous*; this law had already been observed by Schlosser and myself (in *Hyracotherium*), and has now been worked out in many groups by Scott who will shortly publish an abstract of his results.

The principles upon which the new terminology is based are very simple:

1. The termination *-cone* is given to the central primary cusps, and *-conule* to the "intermediate" cusps.
2. The termination *-style* is proposed for the peripheral cusps arising from the cingulum—the Greek form of Huxley's term pillar; these pillars are given the same prefix as the nearest cone.
3. The termination *-loph* is given to the crests.
4. The prefixes are based upon the succession and position of the elements in the primitive evolution of the crown—viz: *proto-*, *para-*, *meta-*, *hypo-*, *ento-*, *ecto-*, *meso-*.
5. In describing the molars of the more primitive types we have to use repeatedly the term "primitive triangle" composed of the paracone, metacone and protocone—for this I propose to substitute the term *trigon* to distinguish the higher and more primitive part of the crown from the lower and secondary *talon*.
6. Corresponding or homologous elements in the upper and lower jaws are given similar terms but distinguished by the arbitrary addition of *-id*.

#### NEW TERMS PROPOSED.

<i>Upper Molars.</i>	<i>Lower Molars.</i>	
Trigon .....	Trigonid = Primitive Triangle	{ Proto-Para and Metacones. Hypoconid, En- toconid, Hypo- conulid.
Talon.....	Talonid = Heel.....	
Parastyle = Antero-External buttress.....		
Mesostyle = Median Exter- nal buttress.....		
Metastyle = Postero Exter- nal buttress.....	Metastylid = (Reduplication of Metaconid in <i>Equi- dae</i> and other forms).	
Hypostyle = Postero median buttress (developed only in <i>Equidae</i> ).....		
Ectoloph = External crest...		
Protoloph = Anterior crest..		
Metaloph = Posterior crest..	Metalophid = Anterior crest.....	
	Hypolophid = Posterior crest.....	
	Hypoconulid = Posterior interme- diate cusp (3d lobe of last lower molar).	

HENRY F. OSBORN,

American Museum of Natural History,

April 25th, 1892.

Central Park, New York.